

REMARKS

Claims 1, 3-9 and 11-15 are now in the application. The recent telephonic interview so courteously granted by examiner Oh is hereby noted with appreciation. Claim 1 has been amended along the lines discussed during the telephonic interview to recite “catalyst is obtained by causing said tungsten species to be supported on a porous support and, further separately causing a third element other than the component elements of said porous support and the tungsten element to be present in said catalyst as a component different from said tungsten species or the porous support;” in place of “said tungsten species is caused to be supported on a porous support and, further, a third element other than the component elements of said porous support and the tungsten element is caused to coexist in said catalyst” for purposes of clarification. This is consistent with the specification and especially the examples. Also, as discussed during the telephonic interview, claim 1 has been amended to recite “wherein said third element comprises at least one element selected from the group consisting of the elements of the groups 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 and 17 of the periodic table” from claim 2. Accordingly, claims 2 and 16-20 have been canceled and claims 4 and 5 have been amended to depend from claim 1 instead of claim 2. Claims 9 has been amended to recite “salts of heteropolyoxometallate anions comprising tungsten atom, wherein the heteropolyoxometallate anions comprising tungsten atom, are represented by the formula” in place of “tungsten atom-containing heteropolyoxometallate anions , wherein the tungsten atom- containing heteropolyoxometallate anions are represented by the general formula “ for purposes of clarification. The amendments to the claims do not introduce new matter.

The rejection of Claims 1, 3, 6-9 and 11-20 under U.S.C. 112, second paragraph has been overcome by the above amendments to the claims. In particular, claim 1 has been amended to clarify that the third element does not exists as the component of the catalyst compound or the porous support compound, but exist as the third element itself or as the component of the compound which is different from the catalyst compound or the porous support compound. In addition, claim 9 now recite “salts of heteropolyoxometallate anions comprising tungsten atom, wherein the heteropolyoxometallate anions comprising tungsten atom, are represented by the formula”. Claim 9 as noted recites “formula” instead of “general formula”.

With respect to the rejections of claims 1-10 and 17-20 under U.S.C. 102(b) as being anticipated by Watanabe et al (J. of Molecular Catalysis A: Chem., 145 (1999), pp. 281-289); of claims 1-7, 9-10, 17-18 and 20 under 35 USC 102(b) over Sakamoto et al (Tetrahedron Letters 41 (2000) pp. 10009-10012); of 1-5, 7-10 and 18-20 under 35 USC 102(b) over Briot et al; (J.Mater. Chem. 2000, 10, pp. 953-958); of claims 1-5, 7-10, 16 and 18-20 under 35 USC 102 (b) over Jin et al (J of Catalysis, 203, 2001, pp. 75-81); of Claims 1-5, 7-10 and 18-20 under 35 USC 102(b) over WO 98/54165 to Neumann et al; of Claims 1-7, 9-10, 16-18 and 20 under 35 USC 102 (b) over WO 94/21583 to Brown et al; and of claims 1-7, 9-10, 16-18 and 20 under 35 USC 102 (b) over WO 93/00338 to Brown et al; none of the cited references disclose or suggest the catalyst comprising a tungsten species as an essential component as supported on a porous support and further comprising a third element other than component elements of the porous support and the tungsten element as caused to coexist in the catalyst.

In the present invention, as discussed during said telephonic interview, the third element does not exists as the component of the catalyst compound or the porous support compound, but exists or coexists as the third element itself or as the component of the compound which is different from the catalyst compound or the porous support compound as now more clearly pointed out in the claims.

The difference of the catalyst of the present invention and the catalyst disclosed in the cited references becomes clear by the amendment of Claim 1 and therefore, as discussed during said telephonic interview, it is clear that the present invention is novel over the cited references.

Claim 1-10 and 17-20 were rejected under 35 USC 102(b) as being anticipated by Watanabe et al, J. of Molecular Catalysis A: Chem., 145 (1999), pp. 281-289 (hereinafter also referred to as “Watanabe”). Watanabe fails to anticipate claims 1-10 and 17-20.

Watanabe suggests an epoxidation reaction with a heteropolyoxometallate supported on LDH. However, nothing is disclosed or suggested therein about the coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element.

Claims 1-7, 9-10, 17-18 and 20 were rejected under 35 USC 102(b) as being anticipated by Sakamoto et al, Tetrahedron Letters 41 (2000), pp. 10009-10012 (hereinafter also referred to as Sakamoto). Sakamoto fails to anticipate claims 1-7, 9-10, 17-18 and 20.

Sakamoto suggests an epoxidation reaction with a heteropolyoxometallate supported on an organic group substituted SiO₂. However, nothing is disclosed or suggested therein about the coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element.

Claims 1-5, 7-10 and 18-20 were rejected under 35 USC 102(b) as being anticipated by Briot et al, J. Mater. Chem. 2000, 10, pp. 953-958 (hereinafter also referred to as Briot). Briot fails to anticipate claims 1-5, 7-10 and 18-20.

Briot suggests an epoxidation reaction with tungsten supported on MCM-41. However, nothing is disclosed or suggested therein about the coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element coexistence. The “Cyclooctene conversion” part in Table 2 was referred to on page 7 of the office action. However, it should be noted that in Briot, it is considered that cyclooctene conversion is high because 5 times as much hydrogen peroxide (oxidizing agent) as the alkene substrate is used in the reaction. Thus, this reaction system is chemically and economically inefficient.

Claims 1-5, 7-10 16 and 18-20 were rejected under 35 USC 102(b) as being anticipated by Jin et al, J. of Catalysis, 203, 2001, pp. 75-81 (hereinafter also referred to as Jin). Jin fails to anticipate claims 1-5, 7-10, 16 and 18-20.

Jin suggests an epoxidation reaction with tungsten supported on SiO₂. However, nothing is disclosed or suggested therein about the coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element. It is reported in Jin that a significant decrease in the activity of catalyst is observed. This is because the third element does not coexist with the catalyst.

Claims 1-5, 7-10 and 18-20 were rejected under 35 USC 102(b) as being anticipated by WO 98/54165 to Neumann et al. (herein also referred to as Neumann). Neumann does not anticipate claims 1-5, 7-10 and 18-20.

The catalyst suggested in Neumann comprises tungsten and zinc as the component of one compound. This is quite different from the “coexist” form of the catalyst in the present invention. In addition, the active site of the catalyst in Neumann is ruthenium; whereas, the active site of the catalyst of the present invention is tungsten. Also, Neumann fails to disclose calcination of the catalyst.

Claims 1-7, 9-10, 16-18 and 20 were rejected under 35 USC 102(b) as being anticipated by WO 94/21583 to Brown et al. (hereinafter referred to as Brown).

Brown fails to anticipate claims 1-7, 9-10, 16-18 and 20. Brown suggests an epoxidation reaction with tungsten supported on the support. However, nothing is disclosed or suggested therein about the coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element.

Claims 1-7, 9-10, 16-18 and 20 were rejected under 35 USC 102(b) as being anticipated by WO 93/00338 to Brown et al. (hereinafter referred to as Brown).

Brown suggests an epoxidation reaction with tungsten supported on the support. However, nothing is disclosed or suggested therein about as coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element.

The cited references fail to anticipate the present invention. In particular, anticipation requires the disclosure, in a prior art reference, of each and every recitation as set forth in the claims. *See Titanium Metals Corp. v. Banner*, 227 USPQ 773 (Fed. Cir. 1985), *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 1 USPQ2d 1081 (Fed. Cir. 1986), and *Akzo N.V. v. U.S. International Trade Commissioner*, 1 USPQ2d 1241 (Fed. Cir. 1986).

There must be no difference between the claimed invention and reference disclosure for an anticipation rejection under 35 U.S.C. 102. *See Scripps Clinic and Research Foundation v.*

Genetech, Inc., 18 USPQ2d 1001 (CAFC 1991) and *Studiengesellschaft Kohle GmbH v. Dart Industries*, 220 USPQ 841 (CAFC 1984).

With respect to the rejection of claims 1-10 and 16-20 under U.S.C. 103(a) as being unpatentable over Briot et al (J. of Molecular Catalysis A: Chem., 145 (1999), p 281-289) in view of Neumann et al (WO 98/54165);

As shown in Table 4 of the present specification, “W/Al₂O₃” type catalyst shows higher yield when the third element exists as a component that is different from the tungsten species or the porous support. This is clear from the comparison between examples 14 to 24 and comparative example 4.

Also, “W/SnO₂” type catalyst shows higher yield when the third element coexist. This is clear from the comparison between examples 25 to 27 and comparative example 5.

The effect of coexistence of the third element as a component that is different from the tungsten species or the porous support is also demonstrated in tables 5 to 7.

The cited references disclosed nothing specifically with respect to the coexistence of the third element with the tungsten species supported on the porous support, nor does it focus on the importance of such aspect.

The present invention is achieved by optimization of the catalyst used in the liquid phase oxidation reaction, and shows superior results and unexpected advantages as compared to the prior art such as effectiveness in improving or maintaining the catalytic activity performance and, further, in preventing the catalyst component tungsten species from being leached into liquid reaction mixtures, with the result that the catalysts can be prevented from decreasing in catalytic activity and therefore can be reused to a greater extent.

Therefore, it would not have been obvious to the skilled artisan in the art to reach to the present invention from the disclosure of the cited references, which fail to disclose the coexistence of the third element.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

In the event the Examiner believes an interview might serve to advance the prosecution of this application in any way, the undersigned attorney is available at the telephone number noted below.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, under Order No. 21581-00298-US1 from which the undersigned is authorized to draw.

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Respectfully submitted,

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